REMARKS/ARGUMENTS

This present amendment is in response to the Official Action mailed June 03, 2004, in which Claims 16, 17, and 19 through 39 were allowed, Claims 1-4, 6, 8-10, and 12 were rejected under 35 U.S.C. Section 102(e) as being anticipated by Rodder et al (U.S. Patent No. 6,251,761), and Claims 1-4, 6-10, and 15 were rejected under 35 U.S.C. Section 102(e) as being anticipated by Harada (U.S. Patent No. 6,642,131), and Claims 5 and 11-12 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Harada (U.S. Patent No. 6,642,131) in view of Batra et al (U.s. Patent No. 6,417,085).

Applicant has thoroughly reviewed the outstanding Office Action including the Examiner's remarks and the reference cited therein. The following remarks are believed to be fully responsive to the Office Action and, when coupled with the amendments made herein, are believed to render all claims at issue patentably distinguishable over the cited references.

Claims 2, 14 and 18 are amended herein. No claims are cancelled. No claims are added. Accordingly, Claims 1 through 39 remain pending.

All the changes are made for clarification and are based on the application and drawings as originally filed. It is respectfully submitted that

no new matter is added.

Applicants respectfully request reconsideration in light of the above amendments and the following remarks.

CLAIM OBJECTIONS

With respect to Page 2 of the Office Action, the Examiner objected Claims 2, 14 and 18 because of the informalities. Examiner alleges that "steps" in line 1 of Claim 2 should be changed to -- step – to reflect a single step of forming a first barrier layer in claim 1.

Applicant has replaced the mistyped "steps" with -- step --. Furthermore, Applicant has changed Claim 14 that depended on claim 9. Thus, Applicants respectfully submit that the objections to the Claims 2 and 14 are now overcome.

Furthermore, Examiner alleges that Claim 18 was objected to under 37 CFR 1.75 (c), as being of improper dependent form for failing to further limit the subject matter of previous claim. According to the Examiner's opinion, the Applicant has replaced "ammonia" with -- nitrogen-containing-- before "rapid thermal process (NH_3 RTP)" in Claim 18. Because independent Claim 16 discloses the step "treating said substrate by a first nitrogen-containing rapid

thermal process...". Therefore, the subject matter should be amended "first ammonia rapid thermal process" with -- first nitrogen-containing rapid thermal process--. Therefore, Applicant respectfully submits that this objection is overcome.

CLAIM REJECTIONS -35 U.S.C. SECTION 102(e)

With respect to Page 3 through 3 of the Office Action, the Examiner rejected Claims 1-4, 6, 8 , 10, and 12 under 35 U.S.C. Section 102(e) as being anticipated by Rodder et a l(U.S. Patent No. 6,251,761).

The Examiner is of the opinion that Rodder et al ('761) discloses the method for forming a gate electrode. Rodder et al ('761) discloses the remote plasma nitridation (RPN) of the high-K dielectric prior to the formation of a polycrystalline silicon gate" (col. 2, lines 12-14). In addition, Rodder et al ('761) also discloses "following high-k formation, the stack is again subjected to the remote plasma process described above and a top portion of the high-K dielectric will be converted to a nitride (107) (col. 4, lines 42-54, and FIG. 2D).

Applicant respectfully traverses this rejection.

As to Claim 1 recited the second barrier layer is **"deposited"** on the dielectric layer after performing a post-deposition annealing process to the

dielectric layer. Nevertheless, Rodder et al ('761) discloses the nitride is formed by "**remote plasma process**" to the dielectric layer. The performing process is different between the **"depositing"** a second barrier layer on the dielectric layer" and "performing a **remote plasma process to form a nitride** to convert the top portion of dielectric layer". The barrier layer is formed on the dielectric layer by different method between the present invention and Rodder et al ('761). Thus, Rodder et al cannot anticipate the present invention as claimed.

Furthermore, the Examiner alleges that Claims 1-4, 6-10 and 15 were rejected under 35 U.S.C. Section 102(e) as being anticipated by Harada (U.S. Patent No. 6,642,131). The Examiner is of the opinion that Harada discloses the method for forming a gate electrode. Harada ('131) discloses a gate electrode being formed on a substrate via a gate insulating film. The gate insulating film includes a high dielectric constant film containing a metal, oxygen and hydrogen, and a lower barrier film formed below the high dielectric constant film and containing a metal, oxygen, silicon and nitrogen (Abstract). Harada ('131) disclosed the Si_3N_4 film (21A) is oxidized by the O_2 gas as an oxidizing agent, and turns into a SiON film (21B) (col. 13, lines 61-65). In Harada ('131), after Si_3N_4 film (21A) is formed on the silicon

substrate (20), the Si_3N_4 film (21A) is oxidized during the formation the HfO_2 film (22A) to form the SiON film (21B) (col. 13, line 65-col. 14, line 1). Then, "**a heat treatment (post deposition anneal) is performed with respect to the HfO_2 film**" (22A) (col. 14, lines 22-24).

Nevertheless, Harada ('131) discloses the **post-deposition anneal process is performed "after SiON film that is formed on the HfO2 film"**. With regards to Claim 1, the **"post-deposition annealing" is first performed on the dielectric layer, and "then the second barrier layer is deposited on the dielectric layer.".** Thus, the post-deposition annealing process is performed in different structure between the Harada ('131) and amended Claim 1. Therefore, this reference cannot be said to anticipate the present invention. The Examiner's rejection is respectfully traversed.

CLAIM REJECTIONS- 35 U.S.C. SECTION 103 (a)

With respect to Page 5 through Page 6 of the Office Action, the Examiner rejected Claims 5, 11, and 12 under 35 U.S.C. 103(a) as being unpatentable over Harada ('131) in view of Batra et al (U.S. Patent No. 6,417,085).

The Examiner is of the opinion that Harada discloses the process for

forming a gate electrode, except this reference is silent about the time for the thermal process, and the second barrier layer is of silicon dioxide or silicon nitride or silicon oxynitride. Batra et al ('085) discloses the formation of second barrier layer of silicon nitride layer (38) on high dielectric constant layer (24).

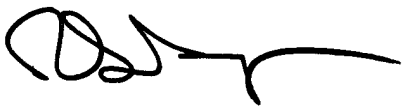
With regards to Claim 1, according to above recitation, the **post-deposition anneal is performed on the SiON film that is formed on the HfO_2 film** as Harada ('131) discloses that which is different from the **post-deposition annealing is performed on the dielectric layer, and then second barrier layer is formed on the dielectric layer** as recited. Although the Examiner that alleges Batra et al ('085) discloses a barrier layer such as silicon dioxide, silicon nitride, or silicon oxynitride, however, the performing process is performed **after second barrier layer that is formed on the HfO_2 film,** which is different the post-deposition annealing performed on the dielectric layer, and then the second barrier layer as recited in Claim 1. Thus, the performing process is different between the combination of the disclosure of Harada ('131) in view of Batra et al ('085) and Claim 1. Therefore, the combination of the disclosures of Harada ('131) in view Batra et al ('085) can not achieve the present invention and Applicant respectfully traverses this rejection as well.

CONCLUSION

In light of the above amendments and remarks, Applicant respectfully submits that all pending Claims 1 - 39 as currently presented are in condition for allowance. If, for any reason, the Examiner disagrees, please call the undersigned attorney at 248-433-7552 in an effort to resolve any matter still outstanding *before* issuing another action. The undersigned attorney is confident that any issue which might remain can readily be worked out by telephone.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



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